

Appl. No. 10/079,012
Amdt. dated August 16, 2004
Reply to Office Action of March 16, 2004

Docket No. A01185

REMARKS/ARGUMENTS

On August 9, 2004, Applicant's agent and Examiner Bisset held an interview. At the interview, agreement with respect to the claims was not reached. The substance of the interview was as follows. Applicant's agent discussed arguments that the reference is not drawn to "polyurethane" materials but rather to modified polymeric structures, also noting a possible limitation to "aliphatic" or "aromatic" polyurethanes. The examiner noted that the broadest interpretation of the terms would be evaluated. The substrates used in the claimed invention and reference were also discussed. The examiner noted that the reference mentions the use of web materials and plastics but does not seem to distinguish them as elastomeric or rubber substrates.

Claims 1-5, 7, 8, and 10 remain in this application. Claims 6 and 9 are canceled.

Amendments: Lack of New Matter

Applicant submits that the forgoing claim amendments do not introduce new matter into the present application.

The list of substrates added to amended claims 5 and 8 is taken from the present specification p. 9, lines 16 - 27. Applicant wishes to point out that the list is introduced with the phrase "elastomeric or rubber substrates such as" (p. 9, lines 17 -18). Therefore, the items in the list that follows that preamble are all disclosed to be rubbers or elastomers. Specifically, thermoplastic polyolefins, polypropylene oxide polymers, and epichlorohydrin polymers are thus each disclosed to be a category of elastomer or rubber. Furthermore, each of thermoplastic polyolefins, polypropylene oxide polymers, and epichlorohydrin polymers, is a well recognized category of elastomer. Therefore, adding the word "elastomer" after each of these items does not add new matter. The selection of the specific elastomers listed in amended claims 5 and 8 were disclosed as a group in the originally-filed claims 6 and 9.

The recitation of types of polyurethane polymers in new claim 11 is taken from the present specification on p. 3, lines 18-19.

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Claims 1-4 in view of US 6,313,335 (Roberts)

In the above-identified Office Action the Examiner rejected claims 1-10 under 35 USC §102(e) as being anticipated by US 6,313,335 (Roberts). Applicant respectfully asserts that the present invention, as recited in independent claim 1, is not anticipated by Roberts.

Applicant respectfully submits that one reason why Roberts does not anticipate the present invention as recited in present claim 1 is that the polymers disclosed by Roberts are a different class of materials from the polyurethane polymer recited in present claim 1. Roberts draws a distinction between "polyurethane dispersions" on the one hand and the polymers of his invention on the other. For example, at col. 3, line 60 through col. 4, line 4, Roberts discusses the drawbacks of "polyurethane dispersions." One such drawback taught by Roberts is poor water resistance: "The ionomeric nature of the polyurethane dispersions which makes them water dispersible, makes the film hydrophilic to some degree." Another drawback taught by Roberts is poor resistance to organic solvents: "Increasing the crosslink density of the polyurethane increases organic solvent resistance but highly branched prepolymers have . . . poor film forming properties."

Roberts teaches that he overcomes these drawbacks with the use of "hydrolyzable and/or hydrolyzed silyl-terminated fluorine containing polyurethanes, silicone containing polyurethanes and fluorine/silicone containing polyurethanes in aqueous dispersion" (col. 5, lines 55-57). The presence of silicone and/or fluorine places the polymers taught by Roberts into a specialty category. Thus, in view of Roberts' teaching, persons of ordinary skill in the art would consider that fluorine containing polymers and silicone containing polymers in dispersion as taught by Roberts were not examples of the category "polyurethane dispersions." Thus, the polymers taught by Roberts are different materials from the polyurethane dispersions used in the present invention as recited in present claim 1. Applicant respectfully submits that this difference in polymers shows that Roberts does not anticipate the present invention as recited in present claim 1.

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The Examiner, in the abovementioned paper, asserts that the antifouling agents taught by Roberts at col. 29, lines 52-61, would be suitable as the slip aids used in the present invention. Applicant respectfully submits that these antifouling agents are further described by Roberts as "leachable additives" and are therefore unsuitable as the slip aid used in the present invention. Roberts teaches that these leachable additives "function by slowly coming to the surface of the coating, creating a weak surface layer." In contrast, the composition of the present invention is described in the present specification as capable of providing a coating that "provides resistance to degradation by abrasion" (p. 1, lines 23-24) and that is "abrasion resistant" (p. 2, line 14). A composition (as taught by Roberts) containing a leachable additive is not capable of providing a coating that is abrasion resistant (like the present invention). Therefore, Applicant respectfully asserts that Roberts does not disclose coating that contain a slip aid as used in the present invention as recited in present claim 1. Applicant therefore further respectfully asserts that this lack of slip aid provides another reason why Roberts does not anticipate the present invention as recited in claim 1.

Additionally, Applicant notes that claims 2, 3, and 4 are dependent on claim 1 and therefore submits that claims 2, 3, and 4 are also not anticipated by Roberts.

Claims 5, 7, 8, and 10 in view of US 6,313,335 (Roberts)

In the above-identified Office Action the Examiner rejected claims 1-10 under 35 USC §102(e) as being anticipated by US 6,313,335 (Roberts). Applicant respectfully asserts that the present invention, as recited in amended independent claims 5 and 8, is not anticipated by Roberts.

First, Applicant reaffirms the arguments made above regarding the distinction between the coating composition of the present invention and the teachings of Roberts. Thus, Applicant submits that the distinction between the coating compositions recited in claims 5 and 8 on the one hand and the compositions taught by Roberts on the other hand provides one reason why Roberts does not anticipate the present invention as recited in present amended claims 5 and 8.

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Second, Applicant submits that the substrate provides a second, independent reason why the present invention as recited in amended claims 5 and 8 is not anticipated by Roberts. Roberts teaches that his compositions are useful "when coated onto a marine type substrate" (col. 5, line 59). Roberts gives this list of possible substrate materials: "leather, woven webs, nonwoven webs, glass, glass fibers, rope fibers, wood, metals, plastics, metal alloys and composite materials" (col. 8, lines 46-50). Roberts gives examples of composite materials: "concrete and fiberglass" (col. 8, line 53). None of the substrate materials disclosed by Roberts are rubber or elastomer.

Rubbers and elastomers are materials that possess the well-known property "rubberlike elasticity," defined, for example, by F.W. Billmeyer, in Textbook of Polymer Science, 2nd edition, Wiley-Interscience, 1971, p. 191 ("Billmeyer"). (A copy of p. 191 of Billmeyer is attached to this communication.) Materials with rubberlike elasticity have properties including the ability to stretch to high elongations and the ability to recover their original shape after such stretching. As Billmeyer teaches, materials with rubberlike elasticity must be polymers with T_g (glass transition temperature) below the temperature of use and must be polymers that are amorphous in the un-stretched state.

Those of ordinary skill in the art will recognize that none of the items in Roberts's disclosed list of possible substrates possesses rubberlike elasticity. For example, leather, glass, wood, and metal are well-known as materials that do not possess rubberlike elasticity.

Additionally, webs and ropes are well-known items whose uses depend on maintaining a fixed shape, so these items also do not possess rubberlike elasticity. Nonwoven webs, for example, are known to those of ordinary skill in the art to be a type of textile. Nonwoven webs are defined, for example, by Fahrbach et. al. in Ullmann's Encyclopedia of Industrial Chemistry (Published by Wiley-VCH Verlag; Online Edition, posted June 15, 2000) as follows:

"In the broadest sense nonwovens are understood to mean
textiles that are manufactured by nonconventional

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technologies. They are made of fiber webs which are
bonded together"

(A copy of the relevant page of Fahrbach's article is attached to this communication.)
Similarly, the term "woven webs" used by Roberts will be understood by those of
ordinary skill in the art to mean textiles that are made by a weaving process. Thus, those
of ordinary skill in the art will understand "webs" to mean textile materials, which are
known to be useful because of their dimensional stability and which are known to lack
rubberlike elasticity.

Further, those of ordinary skill in the art distinguish between "plastics" and
"elastomers" as distinct classes of materials. For example, Billmeyer, on p. 533, states:

"Unlike fibers, elastomers do not in general lend
themselves to plastics uses; elastomers must be amorphous
when unstretched and must be above their glass transition
temperature to be elastic, whereas plastics must be
crystalline or must be used below this temperature to
preserve dimensional stability."

(A copy of p. 533 of Billmeyer is attached to this communication.)

In sum, Applicant respectfully submits that the substrates recited in amended
claims 5 and 8 are different from the substrates disclosed by Roberts. Applicant therefore
asserts that the present invention as recited in amended claims 5 and 8 is novel over
Roberts.

Additionally, Applicant notes that claims 7 and 10 are dependent on claims 5 and
8 and therefore submits that claims 7 and 10 are also not anticipated by Roberts.

New claim 11 in view of US 6,313,335 (Roberts)

Applicant submits that new claim 11 is novel in view of Roberts because it is
dependent on claim 1, which is novel in view of Roberts. Additionally, Applicant
submits that the types of polyurethane polymers recited in new claim 11 fall outside the

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teaching of Roberts. Roberts defines the scope of his teaching as polyurethanes that contain fluorine, silicone, or both (col. 5, lines 55-58). Those of ordinary skill in the art will recognize that the polyurethane polymers recited in new claim 11 contain neither fluorine nor silicone. The terms "aromatic" and "aliphatic" exclude the presence of fluorine and silicone. Therefore, Applicant submits that the subject matter of new claim 11 provides an additional reason for the novelty of new claim 11 over Roberts.

Conclusion


In view of the foregoing amendments and arguments, Applicant respectfully requests the Examiner to reexamine the claimed subject matter, to withdraw the rejections of the claimed subject matter, and to allow claims 1-5, 7, 8, 10, and 11 at this time. If, however, there remain any open issues which the Examiner believes can be resolved by a telephone call, the Examiner is cordially invited to contact the undersigned agent.

An extension fee of \$420.00 is believed to be due in connection with the submission of this Amendment. A Petition for Extension of Time accompanies this Amendment and provides for the payment of the aforesaid fee. No additional are believed to be due; however, if any such fees, including petition or extension fees, are due, the Commissioner is hereby authorized to charge them, as well as to credit any overpayments, to Deposit Account No. 18-1850.

Respectfully Submitted,

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Date: August 16, 2004


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Attachment 1: Billmeyer bibliographic information, p. 191, and p. 533

TEXTBOOK OF POLYMER SCIENCE

Second Edition

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Attachment 1 (continued)

RHEOLOGY AND MECHANICAL PROPERTIES OF POLYMERS 191

where k' is a constant depending only on polymer type. This equation holds over the temperature range from T_g to about $T_g + 100K$.

GENERAL REFERENCES

Eirich 1956-1969; Severs 1962; Van Wazer 1963; Meares 1965, Chap. 13; Reiner 1966; Mendelson 1968.

B. Kinetic Theory of Rubber Elasticity

Rubberlike elasticity is in many respects a unique phenomenon, involving properties markedly different from those of low-molecular-weight solids, liquids, or gases. The properties of typical elastomers are defined by the following requirements:

- a. They must stretch rapidly and considerably under tension, reaching high elongations (500-1000%) with low damping, i.e., little loss of energy as heat.
- b. They must exhibit high tensile strength and high modulus (stiffness) when fully stretched.
- c. They must retract rapidly, exhibiting the phenomenon of *snap* or *rebound*.
- d. They must recover their original dimensions fully on the release of stress, exhibiting the phenomena of *resilience* and *low permanent set*.

Although the thermodynamics associated with rubber elasticity was developed in the middle of the nineteenth century, the molecular requirements for the exhibition of rubbery behavior were not recognized until 1932. Theories of the mechanism relating these molecular structure requirements to the phenomena of rubber elasticity were developed soon after.

As discussed further in Chapter 7F, the molecular requirements of elastomers may be summarized as follows:

- a. The material must be a high polymer.
- b. It must be above its glass transition temperature T_g to obtain high local segment mobility.
- c. It must be amorphous in its stable (unstressed) state for the same reason.
- d. It must contain a network of crosslinks to restrain gross mobility of its chains.

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Attachment 1 (continued)

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Elastomer Technology

The final class of high polymers to be considered in Part V is elastomers. Like fibers, elastomers are considered apart from other polymeric materials because of their special properties. Unlike fibers, elastomers do not in general lend themselves to plastics uses; elastomers must be amorphous when unstretched and must be above their glass transition temperature to be elastic, whereas plastics must be crystalline or must be used below this temperature to preserve dimensional stability.

About 5.7 billion lb of rubber was used in the United States in 1969, with this level expected to increase to 7.5 billion lb by 1975. Synthetics accounted for 77% of the total consumed, with SBR in largest volume by a wide margin, as indicated in Table 19-1. Automobile tires (some 220 million in 1969) remain the largest single end use of rubber, consuming 68% of the total United States production.

History of synthetic rubber The first attempts to produce synthetic rubbers centered around the homopolymerization of dienes, particularly isoprene because it was known to be the monomer for natural rubber. It was found in the late nineteenth century that rubberlike products could be made from isoprene by treating it with hydrogen chloride or allowing it to polymerize spontaneously on storage. These materials could be vulcanized with sulfur, becoming more elastic, tougher, and more heat resistant.

Around 1900 it was discovered that other dienes such as butadiene and 2,3-dimethylbutadiene could be polymerized to rubberlike materials spontaneously by alkali metals or by free radicals. Application was made of these facts during World War I in Germany, where 2,3-dimethylbutadiene was polymerized spontaneously.

After World War I this research on rubberlike products continued, with

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Attachment 2: Excerpt from Ullman's Encyclopedia of Industrial Chemistry

Nonwoven Fabrics

Erich Fahrbach, Carl Freudenberg, Weinheim, Federal Republic of Germany
Gerhard Schaut, Carl Freudenberg, Weinheim, Federal Republic of Germany
Arnold Wegmann, Carl Freudenberg, Weinheim, Federal Republic of Germany

Ullmann's Encyclopedia of Industrial Chemistry

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1. Introduction

Definition. An unambiguous definition of nonwovens has not yet been found. In the broadest sense nonwovens are understood to mean textiles that are manufactured by nonconventional technologies. They are made of fiber webs which are bonded together as a result of inherent fiber-to-fiber friction (entanglement), mechanical treatment, heat, or chemical methods.

Nonwovens (Fig. 1 A) differ from conventional textiles manufactured from yarns [e.g., wovens (Fig. 1 B) and knitted fabrics (Fig. 1 C)] in that they are formed directly from individual fibers. Webs are the starting material for nonwovens (DIN 61 210), and are formed primarily from fibers, possibly with admixture of other fibrous constituents of various types and fiber lengths (e.g., cellulose pulp). The fibers are normally of a limited length, mainly staple fibers (length ca. 30 – 100 mm) that are suitable for spinning into yarn. They may, however, also be only a few millimeters long or of unlimited length (i.e., continuous filaments).



Figure 1. Comparison of a spunbonded nonwoven (A), a textile fabric made of yarn from staple fibers (B), and a knitted fabric of filament yarn (C)

[Full View]

Nonwovens may be produced from staple fibers on a dry basis (dry-laid nonwovens) using methods based on conventional textile technology, or on a wet basis (wet-laid nonwovens) using methods based on conventional paper technology. Spunbondeds are not formed from staple fibers, but from continuous filaments that are produced by melt spinning.

The expression "bonded fabrics" was initially adopted in the United Kingdom. However the broader term "nonwoven fabrics" used in the United States has now found widespread usage. The terms "nonwoven textiles" or simply "nonwovens" are also encountered. These terms all denote textiles that are not woven. In Eastern bloc countries the term "textile composites" is also used to denote nonwovens that include textiles manufactured from fibers by sewing methods. Textile composites are, however, otherwise understood to be fabrics composed of at least two layers or plies bonded together. Nonwoven composites may include yarns as an additional structural element, although the nonwoven character should predominate. Fabrics made of fibrillated plastic films are not included in DIN 61 210.